CLAIMS

1. A fixed wireless access (FWA) communications system comprising an access point and a plurality of subscriber units each transmitting a predetermined data sequence: comprising means for determining the impulse response of the upstream channel between each subscriber unit and the access point; means for generating a data sequence for transmission from a subscriber unit to the access point, the data comprising the predetermined data sequence pre-distorted to compensate for the channel impulse response of the upstream channel between the subscriber unit and the access point, means for storing the pre-distorted predetermined data sequence within the subscriber unit, and means for transmitting the stored sequence from the subscriber unit to the access point when it is desired to transmit the predetermined sequence to the access point.

2. A system as claimed in Claim 1 in which the means for determining the impulse response of the upstream channel comprises means for transmitting a training data sequence having good auto correlation properties from the subscriber unit to the access point, the training data sequence being known to the access point, and means for deriving the channel impulse response from the received data sequence.

3. A system as claimed in Claim 2 in which all subscriber units transmit the same training data sequence to enable their respective upstream channel impulse responses to be determined.

4. A system as claimed in any preceding claim in which the access point is arranged to transmit the respective upstream channel impulse response and a unique contention word to each subscriber unit, the contention word being the predetermined data sequence, the means for generating the pre-distorted contention word being located within the subscriber unit.

5. A system as claimed in any of Claims 1 to 3 in which the access point is arranged to allocate a unique contention word to the subscriber unit, to calculate a pre-distorted contention word from the upstream channel impulse response, the pre-distorted contention word being such that when it is transmitted from the subscriber unit the access point is capable of decoding it without using equalisation, and to transmit to the subscriber unit the pre-distorted unique contention word to the subscriber unit.

6. A system as claimed in Claim 1 in which the subscriber unit comprises an equaliser for equalising the downstream channel between the access point and the subscriber unit, and the determining means comprises means for transmitting a training data sequence having good auto correlation properties from the subscriber unit to the access point, means for re-transmitting the received training data sequence from the access point to the subscriber unit, and means within the subscriber unit for deriving the upstream channel impulse response from the received re-transmitted training data sequence.

7. A system as claimed in Claim 6 in which the predetermined data sequence is a contention word which is unique to each subscriber unit in the system.

8. A system as claimed in any preceding claim in which the means for generating the data sequence for transmission from the subscriber unit to the access point comprises a processor for calculating the pre-distorted predetermined data sequence from the upstream channel response and the predetermined data sequence using the Moore-Penrose Pseudo-Inverse Algorithm.

9. A system as claimed in any preceding claim in which the means for generating the data sequence for transmission from the subscriber unit to the access point comprises a processor for calculating the pre-distorted predetermined data sequence from the upstream channel response and the predetermined data sequence using a singular-value decomposition (SVD) Algorithm.

10. A subscriber unit for use in a fixed wireless access system as claimed in any of Claims 1 to 9: the subscriber unit comprising means for transmitting a training sequence having good auto correlation properties over an upstream channel to the access point; means for storing, in pre-distorted form, a unique contention word received from the access point, the pre-distorted form being such as to compensate for the impulse response of the upstream channel; and means for transmitting the pre-distorted contention word to the access point in order to request access to a transmission channel.

11. A subscriber unit as claimed in Claim 10 arranged to receive the pre-distorted contention word from the access point over the downstream channel.

12. A subscriber unit as claimed in Claim 10 arranged to receive the contention word from the access point over the downstream channel together with the upstream channel impulse response calculated at the access point from the training sequence transmitted by the subscriber unit, wherein the subscriber unit comprises means for calculating a pre-distorted contention word from the received contention word and channel impulse response , the pre-distorted contention word being such as to compensate for the impulse response of the upstream channel so that the access point receives the contention word in a form which it can decode without using equalisation, and means for storing the calculated pre-distorted contention word in memory.

13. A subscriber unit as claimed in Claim 12 in which the calculating means comprises a processor for calculating the upstream channel response from the received re-transmitted training data sequence.

14. A subscriber unit as claimed in Claim 10 arranged to receive a unique contention word and the training sequence re-transmitted by the access point in the form received by the access point: the subscriber unit comprising means for determining the upstream channel impulse response from the received re-transmitted training sequence; means for calculating a pre-distorted contention word using the unique contention word and the determined upstream channel impulse response such that on transmission of the

pre-distorted contention word over the upstream channel the access point is able to decode the contention word without the use of equalisation; and means for storing the calculated pre-distorted contention word in memory.

15. A subscriber unit as claimed in any of Claims 12 to 14 in which the means for calculating the pre-distorted contention word comprises a processor using the Moore-Penrose Pseudo-Inverse Algorithm to calculate the pre-distorted contention word from the upstream channel impulse response and the received contention word.

16. A subscriber unit as claimed in any of Claims 12 to 14 in which the means for calculating the pre-distorted contention word comprises a processor using a singular-value decomposition (SVD) Algorithm to calculate the pre-distorted contention word from the upstream channel impulse response and the received contention word.

17. An access point for use in a fixed wireless access system as claimed in any of Claims 1 to 9: the access point comprising means for receiving a training data sequence having good auto correlation properties from a subscriber unit; means for allocating the subscriber unit a unique contention word; means for calculating the upstream channel impulse response between the subscriber unit and the access point from the received training data sequence; means for generating a pre-distorted contention word from the calculated upstream channel impulse response and the allocated contention word;

and means for transmitting the pre-distorted contention word to the subscriber unit.

18. An access point as claimed in Claim 17 in which the generating means comprises a processor for generating the pre-distorted contention word from the upstream channel impulse response and the contention word using the Moore-Penrose Psuedo Inverse Algorithm.

19. An access point for use in a fixed wireless access system as claimed in any of Claims 1 to 9 comprising means for receiving a training data sequence having good auto correlation properties from a subscriber unit; means for allocating the subscriber unit a unique contention word; and means for transmitting the received training data sequence together with the unique contention word.

20. An access point as claimed in Claim 17 in which the generating means comprises a processor for generating the pre-distorted contention word from the upstream channel impulse response and the contention word using a singular-value decomposition (SVD) Algorithm.

21. A method of transmitting a predetermined data sequence from a transmitter in a subscriber unit to a receiver in an access point in a fixed wireless access system over a transmission channel having a channel impulse response comprising the steps of;
a) determining the channel impulse response,
b) pre-distorting the predetermined data sequence using the determined channel impulse response so that when transmitted over the channel and received

at the receiver it can be decoded without the use of equalisation, and

c) storing the pre-distorted data sequence in memory in the subscriber unit.

22. A method as claimed in Claim 21 in which step a) comprises the steps of;

d) transmitting a training data sequence from the subscriber unit to the access point and,

e) calculating the channel impulse response from the received training data sequence.

23. A method as claimed in Claim 22 in which step e) is carried out at the access point and comprising the further steps of;

f) transmitting the calculated channel impulse response from the access point to the subscriber unit, and

g) transmitting the predetermined data sequence from the access point to the subscriber unit.

24. A method as claimed in Claim 22 in which steps b) and e) are carried out in the access point and comprising the further step of transmitting the pre-distorted predetermined data sequence from the access point to the subscriber unit.

25. A method as claimed in Claim 22 comprising the step of re-transmitting the training data sequence from the access point to the subscriber unit wherein step e) is carried out at the subscriber unit.

26. A method as claimed in any of Claims 21 to 25 in which step b) is carried out by generating the pre-distorted predetermined data sequence from the

predetermined data sequence and the channel impulse response using the Moore-Penrose Pseudo-Inverse Algorithm.

27. A method as claimed in any of Claims 21 to 25 in which step b) is carried out by generating the pre-distorted predetermined data sequence from the predetermined data sequence and the channel impulse response using a singular-value decomposition (SVD) Algorithm.